

Remarks

The Office Action mailed July 9, 2008, has been carefully reviewed and the foregoing request for reconsideration has been made in consequence thereof.

Claims 1-8, 11-18, and 21-25 are now pending in this application. Claims 1-8, 11-18, and 21-25 are rejected. Claims 9, 10, 19, 20, 26, and 27 have been canceled.

The rejection of Claims 1, 6, 7, 11, 16, 17, 21, 22, and 24 under 35 U.S.C. § 103(a) as being unpatentable over Okerlund (U.S. Patent No. 6,526,117) (herein after referred to as "Okerlund") in view of Mostafavi "Overview of Post-Processing Algorithm to Create Volumetric Motion Sequences" (herein after referred to as "Mostafavi") is respectfully traversed.

Okerlund describes a method for generating an optimally registered working set of computer tomography images. A Region of Interest, or a ROI, (43) is divided into separate sub-volumes (122, 124 ...134) that each correspond to a diastolic phase (DP) of a patient. Each separately acquired image set (106, 108...118) corresponds to one of the sub-volumes (122, 124...134) such that each image set (106, 108...118) corresponds to the diastolic phase (DP). A system operator selects a specific phase point (SP) from within the diastolic phase (DP) at which an image reconstructor (68) should create transaxial slice images. The reconstructor (68) retrieves a sub-set of image data corresponding to a phase range (Ψ_N) centered on the phase location (SP) to generate a transaxial slice image set (106(Ψ_N), 108(Ψ_N)...118(Ψ_N)). Each transaxial slice image set (106(Ψ_N), 108(Ψ_N)...118(Ψ_N)) corresponds to one of the ROI sub-volumes (122, 124...134).

To facilitate aligning the transaxial slice image sets (106(Ψ_N), 108(Ψ_N)...118(Ψ_N)), the diastolic phase (DP) is sub-divided into separate phase ranges (Ψ_{N-2} , Ψ_{N-1} , Ψ_N , Ψ_{N+1} , Ψ_{N+2}), where one phase dependent image slice data set (112(Ψ_{N-2}), 112(Ψ_{N-1}), 112(Ψ_N), 112(Ψ_{N+1}), 112(Ψ_{N+2})) corresponds to a respective phase range (Ψ_{N-2} , Ψ_{N-1} , Ψ_N , Ψ_{N+1} , Ψ_{N+2}). The acquired image sets (106, 108...118) corresponding to adjacent ROI sub-volumes (122, 124 ...134) are compared to identify an optimal working set that includes a separate acquired image set (106, 108...118) that corresponds to a respective ROI sub-volume (122, 124 ...134). A

phase dependent image slice image set ($112(\Psi_{N-2})$, $112(\Psi_{N-1})$, $112(\Psi_{N+1})$, $112(\Psi_{N+2})$) from another phase within the sub-volume image set (106, 108...118) is substituted for a misaligned image set ($112(\Psi_N)$) to facilitate increasing the diagnostic characteristics of an optimal working image set such that the optimal set includes image sets (106, 108...118) taken at different phase ranges (Ψ_{N-2} , Ψ_{N-1} , Ψ_N , Ψ_{N+1} , Ψ_{N+2}). Notably, Okerlund does not describe or suggest calculating a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images.

Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin.

Claim 1 recites a method for retrospective internal gating, said method comprising “scanning a patient to obtain projection data . . . generating images from the projection data . . . obtaining a signal representing information regarding a physiological cycle of motion of an object within the patient . . . associating a plurality of points of the physiological cycle with each of the generated images . . . calculating a phase of each of the generated images based on an average of phases of a respective plurality of points associated with each of the generated images . . . specifying at least one target phase in the physiological cycle of motion . . . and sorting the generated images based on the at least one target phase within the physiological cycle of motion of the object to generate at least one set of images.”

Neither Okerlund nor Mostafavi describe or suggest a method for retrospective internal gating as recited in Claim 1. More specifically, neither Okerlund nor Mostafavi describe or suggest a method that includes calculating a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images. Rather, in contrast to the present invention Okerlund describes subdividing a region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each

phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. However neither Okerlund or Mostafavi considered alone or in combination describe or suggest calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.)

Furthermore, neither Okerlund nor Mostafavi describe or suggest a method that includes associating a plurality of points of a physiological cycle with each generated image. Okerlund describes subdividing a region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Okerlund in view of Mostafavi.

Claims 6 and 7 depend from independent Claim 1. When the recitations of Claims 6 and 7 are considered in combination with the recitations of Claim 1,

Applicants submit that Claims 6 and 7 likewise are patentable over Okerlund in view of Mostafavi.

Claim 11 recites a system for imaging a moving object within a patient, the system comprising “a scanner configured to acquire projection data of the patient . . . an image reconstructor configured to generate images corresponding to the projection data . . . and a controller configured to . . . receive a signal representing information regarding a cycle of motion of the object . . . receive generated images from said image reconstructor . . . associate a plurality of points of the cycle of motion with each of the generated images . . . calculate a phase of each of the generated images based on an average of phases of a respective plurality of points associated with each of the generated images . . . enable a user to specify at least one target phase within the cycle of motion . . . and sort the generated images based on the at least one target phase within the cycle of motion of the object to generate at least one set of images.”

Neither Okerlund nor Mostafavi describe or suggest a system for imaging a moving object as recited in Claim 11. More specifically, neither Okerlund nor Mostafavi describe nor suggest a system that includes a controller configured to calculate a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images. Rather, in contrast to the present invention, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. A description of averaging the phases of several sequential images

and then assigning that average to each of the sequential images is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images.* (Emphasis added.)

Furthermore, neither Okerlund nor Mostafavi describe or suggest a controller configured to associate a plurality of points of a physiological cycle with each generated image. Okerlund describes subdividing a region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin.

Accordingly, for at least the reasons set forth above, Claim 11 is submitted to be patentable over Okerlund in view of Mostafavi.

Claims 16 and 17 depend from independent Claim 11. When the recitations of Claims 16 and 17 are considered in combination with the recitations of Claim 11, Applicants submit that Claims 16 and 17 likewise are patentable over Okerlund in view of Mostafavi.

Claim 21 recites a system for imaging a moving object within a patient, the system comprising “a computed tomography (CT) scanner configured to acquire projection data of the patient . . . an image reconstructor coupled to the CT scanner and configured to generate images corresponding to the projection data . . . and a controller coupled to the image reconstructor and configured to . . . receive a signal representing information regarding a cycle of motion of the object . . . receive generated images from said image reconstructor . . . associate a plurality of points of the cycle of motion with each of the generated images . . . calculate a phase of each of the generated images based on an average of phases of a respective plurality of points

associated with each of the generated images . . . enable a user to specify at least one target phase within the cycle of motion . . . and sort the generated images based on the at least one target phase within the cycle of motion of the object to generate at least one set of images.”

Neither Okerlund nor Mostafavi describe or suggest a system for imaging a moving object as recited in Claim 21. More specifically, neither Okerlund nor Mostafavi describe or suggest a system that includes a controller coupled to the image reconstructor and configured to calculate a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images. Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. A description of averaging the phases of several sequential images and then assigning that average to each of the sequential images is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.)

Furthermore, neither Okerlund nor Mostafavi describe or suggest a controller configured to associate a plurality of points of a physiological cycle with each generated image. Okerlund describes subdividing a region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set

corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin.

Accordingly, for at least the reasons set forth above, Claim 21 is submitted to be patentable over Okerlund in view of Mostafavi.

Claim 22 recites a computer configured to “instruct a scanner to acquire projection data of the patient . . . instruct an image reconstructor to generate images corresponding to the projection data . . . receive a signal representing information regarding a cycle of motion of the object . . . receive generated images from the image reconstructor . . . associate a plurality of points of the cycle of motion with each of the generated images . . . calculate a phase of each of the generated images based on an average of phases of a respective plurality of points associated with each of the generated images . . . enable a user to specify at least one target phase within the cycle of motion . . . and sort the generated images based on the at least one target phase within the cycle of motion of the object to generate at least one set of images.”

Neither Okerlund nor Mostafavi describe or suggest a computer as recited in Claim 22. More specifically, neither Okerlund or Mostafavi describe or suggest a computer configured to calculate a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images. Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated*

images. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. A description of averaging the phases of several sequential images and then assigning that average to each of the sequential images is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images.* (Emphasis added.)

Furthermore, neither Okerlund nor Mostafavi describe or suggest a computer configured to associate a plurality of points of a physiological cycle with each generated image. Okerlund describes subdividing a region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin.

Accordingly, for at least the reasons set forth above, Claim 22 is submitted to be patentable over Okerlund in view of Mostafavi.

Claim 24 recites a computer-readable medium encoded with a program configured to “instruct a scanner to acquire projection data of the patient . . . instruct an image reconstructor to generate images corresponding to the projection data . . . receive a signal representing information regarding a cycle of motion of the object . . . receive generated images from the image reconstructor . . . associate a plurality of points of the cycle of motion with each of the generated images . . . calculate a phase of each of the generated images based on an average of phases of a respective

plurality of points associated with each of the generated images . . . enable a user to specify at least one target phase within the cycle of motion . . . and sort the generated images based on the at least one target phase within the cycle of motion of the object to generate at least one set of images.”

Neither Okerlund nor Mostafavi considered alone or in combination describe or suggest a computer-readable medium as recited in Claim 24. More specifically, neither Okerlund nor Mostafavi describe or suggest a program configured to calculate a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images. Rather, Okerlund describes subdividing a region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. A description of averaging the phases of several sequential images and then assigning that average to each of the sequential images is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.)

Furthermore, neither Okerlund nor Mostafavi describe or suggest a computer-readable medium encoded with a program configured to associate a plurality of points of a physiological cycle with each generated image. Okerlund describes subdividing a region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic

phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin.

Accordingly, for at least the reasons set forth above, Claim 24 is submitted to be patentable over Okerlund in view of Mostafavi.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1, 6, 7, 11, 16, 17, 21, 22, and 24 be withdrawn.

The rejection of Claims 2-5, 8, 12-15, 18, 23, and 25 under 35 U.S.C. § 103(a) as being unpatentable over Okerlund in view of Mostafavi and Kaufman et al. (U.S. Pat. No. 7,006,862) ("Kaufman") in further view of Heuscher et al. (U.S. Pub. No. 2003/0007593) ("Heuscher") is respectfully traversed.

Okerlund is described above. Mostafavi is described above. Kaufman describes a gating method used to select a plurality of images that are obtained during diastole. More specifically, heart frequency information is used, along with information obtained with a plurality of derivative filters, to obtain time and phase information for generating an image in which a heart is at its largest volume.

Heuscher describes a computed tomography imaging method. In the method, electrocardiograph (ECG) data is analyzed (108) to identify a number of cardiac cycles corresponding to a selected number of cardiac cycles (106), and to identify a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state (110).

Claims 2-5, and 8 depend from independent Claim 1, which is recited above.

None of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination, describe nor suggest a method for retrospective internal gating as recited in Claim 1. More specifically, none of Okerlund, Mostafavi, Kaufman, and Heuscher,

considered alone or in combination, describe nor suggest a method that includes calculating a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images.

Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. A description of averaging the phases of several sequential images and then assigning that average to each of the sequential images is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Kaufman describes generating an image in which a heart is at its largest volume by obtaining time and phase information, and Heuscher describes identifying a number of cardiac cycles corresponding to a selected number of cardiac cycles and identifying a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state by analyzing electrocardiograph data.

Furthermore, None of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination suggest a method that includes associating a plurality of points of a physiological cycle with each generated image. Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set

for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. Kaufman describes generating an image in which a heart is at its largest volume by obtaining time and phase information, and Heuscher describes identifying a number of cardiac cycles corresponding to a selected number of cardiac cycles and identifying a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state by analyzing electrocardiograph data.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Okerlund in view of Mostafavi and Kaufman, in further view of Heuscher.

When the recitations of Claims 2-5, and 8 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-5, and 8 likewise are patentable over Okerlund in view of Mostafavi and Kaufman, in further view of Heuscher.

Claims 12-15, and 18 depend from independent Claim 11, which is recited above.

None of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination, describe nor suggest a system for imaging a moving object as recited in Claim 11. More specifically, none of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination, describe nor suggest a system that includes a controller configured to calculate a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images.

Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set

corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. A description of averaging the phases of several sequential images and then assigning that average to each of the sequential images is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Kaufman describes generating an image in which a heart is at its largest volume by obtaining time and phase information, and Heuscher describes identifying a number of cardiac cycles corresponding to a selected number of cardiac cycles and identifying a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state by analyzing electrocardiograph data.

Furthermore, None of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination suggest a controller configured to associate a plurality of points of a physiological cycle with each generated image. Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. Kaufman describes generating an image in which a heart is at its largest volume by obtaining time and phase information, and

Heuscher describes identifying a number of cardiac cycles corresponding to a selected number of cardiac cycles and identifying a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state by analyzing electrocardiograph data.

Accordingly, for at least the reasons set forth above, Claim 11 is submitted to be patentable over Okerlund in view of Mostafavi and Kaufman, in further view of Heuscher.

When the recitations of Claims 12-15, and 18 are considered in combination with the recitations of Claim 11, Applicants submit that dependent Claims 12-15, and 18 likewise are patentable over Okerlund in view of Kaufman, in further view of Heuscher.

Claim 23 depends from Claim 22, which is recited above.

None of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination, describe nor suggest a computer as recited in Claim 22. More specifically, none of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination, describe nor suggest a computer configured to calculate a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images.

Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average

bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. A description of averaging the phases of several sequential images and then assigning that average to each of the sequential images is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images.* (Emphasis added.) Kaufman describes generating an image in which a heart is at its largest volume by obtaining time and phase information, and Heuscher describes identifying a number of cardiac cycles corresponding to a selected number of cardiac cycles and identifying a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state by analyzing electrocardiograph data.

Furthermore, None of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination suggest a computer configured to associate a plurality of points of a physiological cycle with each generated image. Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. Kaufman describes generating an image in which a heart is at its largest volume by obtaining time and phase information, and Heuscher describes identifying a number of cardiac cycles corresponding to a selected number of cardiac cycles and identifying a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state by analyzing electrocardiograph data.

Accordingly, for at least the reasons set forth above, Claim 22 is submitted to be patentable over Okerlund in view of Mostafavi and Kaufman, in further view of Heuscher.

When the recitations of Claim 23 are considered in combination with the recitations of Claim 22, Applicants submit that dependent Claim 23 likewise is patentable over Okerlund in view of Kaufman, in further view of Heuscher.

Claim 25 depends from independent Claim 24, which is recited above.

None of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination, describe nor suggest a computer-readable medium as recited in Claim 24. More specifically, none of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination, describe nor suggest a computer-readable medium encoded with a program configured to calculate a phase of each generated image based on an average of phases of a respective plurality of points associated with each of the generated images.

Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. A description of acquiring separate image sets for each diastolic phase is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. A description of averaging the phases of several sequential images and then assigning that average to each of the sequential images is not a description of calculating a phase of each generated image *based on an average of phases of a respective plurality of points associated with each of the generated images*. (Emphasis added.) Kaufman describes generating an image in which a heart is at its largest volume by obtaining time and phase information, and Heuscher describes identifying a number of cardiac cycles corresponding to a selected number of cardiac

cycles and identifying a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state by analyzing electrocardiograph data.

Furthermore, None of Okerlund, Mostafavi, Kaufman, and Heuscher, considered alone or in combination suggest a computer-readable medium encoded with a program configured to associate a plurality of points of a physiological cycle with each generated image. Rather, Okerlund describes subdividing an region of interest based on a diastolic phase, retrieving a transaxial slice image set corresponding to each sub-volume of the region of interest, retrieving a phase dependent slice image set corresponding to each phase range within the diastolic phase, and substituting a phase dependent slice image set for a misaligned one of the transaxial slice image sets. Mostafavi describes a post processing algorithm to create volumetric motion sequences. Images are grouped into sequential bins based on scan times, the sum of the phase data entry for each image in a bin are averaged to create a bin phase, the bins are ordered, the phase bin interval is calculated from the average bin-to-bin delta phase and then the average phase of each bin is assigned to each image in its bin. Kaufman describes generating an image in which a heart is at its largest volume by obtaining time and phase information, and Heuscher describes identifying a number of cardiac cycles corresponding to a selected number of cardiac cycles and identifying a temporal point in each cardiac cycle corresponding to an occurrence of a selected cardiac state by analyzing electrocardiograph data.

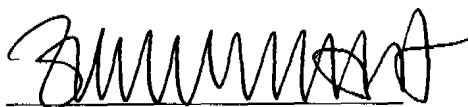
Accordingly, for at least the reasons set forth above, Claim 24 is submitted to be patentable over Okerlund in view of Mostafavi and Kaufman, in further view of Heuscher.

When the recitations of Claim 25 are considered in combination with the recitations of Claim 24, Applicants submit that dependent Claim 25 likewise is patentable over Okerlund in view of Mostafavi and Kaufman, in further view of Heuscher.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 2-5, 8, 12-15, 18, 23, and 25 be withdrawn.

In view of the foregoing remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'William J. Zychlewicz', written over a horizontal line.

William J. Zychlewicz
Registration No. 51,366
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070